NOTES 18: THE NORMAL DISTRIBUTION

Stat 120 | Fall 2025

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Three main topics of Stat120:

1. _____: Summarizing data with numbers and graphs
2. _____: Using confidence intervals to estimate parameters with uncertainty
3. _____: Using p-values to evaluate competing hypotheses

Up until now, we've relied on computer simulations (via StatKey or R) to generate _____ or _____ distributions.

We're now going to begin using _____ to generate these distributions instead

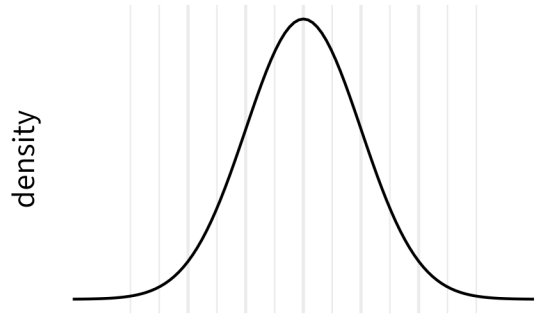
Normal Density Function:

$$f(x) = \frac{1}{\sqrt{2\pi\sigma}} e^{-\frac{1}{2\sigma^2}(x-\mu)^2}$$

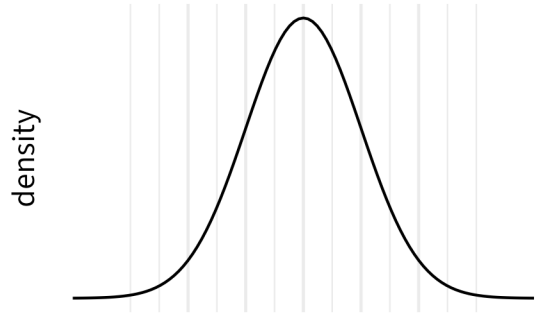
Notation:

Area under the curve =

Example 1: Verbal SAT scores follow a normal distribution with a population mean of $\mu = 580$ and population standard deviation $\sigma = 70$. What proportion of test-takers score above 650?



Example 2: What is the SAT score for the 90th percentile?



Z-scores:

Standard Normal Model

Central Limit Theorem: For random samples, if _____ is big enough, the sampling distribution of _____ is approximately _____, regardless of what shape the population distribution is.

CLT shortcut for testing:

CLT shortcut for confidence intervals:

Summary of R commands (sketch normal curves to help you remember)

```
pnorm(650, mean = 580, sd = 70, lower.tail = FALSE)
```

```
[1] 0.1587
```

```
qnorm(.9, mean = 0, sd = 1, lower.tail = TRUE)
```

```
[1] 1.282
```